TITLE:
Seat construction.

TECHNICAL FIELD:
The invention relates to a seat construction comprising a seat cushion part and a backrest part, and a presence sensor for detecting at least the presence of a person or an object placed in the said seat construction, means for ventilating the seat construction comprising at least one duct through the said presence sensor and at least one air passage through the rest of the seat construction, and a device for feeding an air current through the said air passage and through the said duct for ventilation of a predetermined region adjacent to the seat construction.

PRIOR ART:
In modern-day motor vehicles, for example private cars, various types of safety devices are used for the passengers in the motor vehicle. For example, seat belts and airbags are used to increase safety for the passengers.

An airbag can be placed, for example, in the steering wheel hub of a vehicle, in order to protect the driver of the vehicle, and in the dashboard, in order to protect a passenger in the front passenger seat of the vehicle. Although, for example, an airbag which is placed in the dashboard in front of the front passenger seat can offer good protection for a passenger in this seat, a problem arises from the fact that the airbag can also cause injury if the passenger is sitting, for example, in a heavily forward-leaning position or if there is a rear-facing child seat placed in the passenger seat.

A traditional airbag is optimized in terms of its protective effect for a person of normal build and weight and, not least, a normal sitting position of a passenger in the particular seat. In the event of deviations from these normal conditions, an activated airbag can therefore cause injury to the passenger.

As a result of the above problems, special presence sensors have been produced, intended, for example, for the passenger seat in the front of a vehicle. The purpose of such a presence sensor is to detect whether a

person is sitting in the particular seat and – if so – expediently also to detect and record additional parameters such as, for example, the weight, weight distribution and posture of the person. The presence sensor is further connected to an electronic control unit for the recording of detected parameters. In this way, detected information from the presence sensor can be used to regulate the process for activating an airbag. For example, the airbag can be activated with reduced power, i.e. with a reduced quantity of gas which is generated as it is inflated, if a person is sitting leaning forward in the seat. Likewise, the airbag can be fully prevented from being released if there is a rear-facing child seat placed in the seat. In addition, the time period for the inflation of the airbag can be controlled in dependence on, for example, the weight and posture of the passenger.

According to the prior art, a presence sensor of the aforementioned type can be made up of a bladder which is filled with silicone and which is positioned inside the seat cushion part of the particular seat. The bladder then has an extent which substantially corresponds to the region in which the passenger is expected to sit in the seat. The weight and the weight distribution resulting from a passenger sitting in the seat can then be detected with the aid of a pressure transducer in the bladder and can further be recorded in an electronic control unit. As stated above, the recorded information can afterwards be used for optimal control of an airbag should it be activated in a collision.

A presence sensor of the aforementioned type is previously known through patent document US 6286861.

In order to make optimal use of a presence sensor of the known type, an analysis is normally made of the seat type in which it is intended to be used, especially as regards the pressure changes which occur in the presence sensor in a variety of occurring situations with regard to weight, weight distribution, posture, etc. of a passenger in this seat type. Recorded values from this analysis with respect to pressure changes occurring in the presence sensor as a result of various operating scenarios can then be stored and can constitute a norm for the particular seat type and then, during running, be

used for comparisons with actual measured values. In this way, the process for activating an airbag can be optimally regulated.

In such an analysis, or charting, of the working of a presence sensor in a certain seat type, there are normally certain regions in a fitted presence sensor which do not produce any altered measured signal from the pressure transducer, even if the weight, weight distribution, etc. of the passenger were to change. Such regions, which do not actually contribute to the information for the detection carried out with the aid of the presence sensor, are usually referred to as "dead zones".

Since the dead zones do not contribute to the result from the measurement with the presence sensor, they can be physically removed from the rest of the presence sensor. In this way, a presence sensor can comprise, for example, one or more ducts, the placement of which corresponds to the positions of the respective dead zone. These ducts thus constitute openings straight through the presence sensor and can be used, for example, for drawing cabling through the presence sensor, which is an advantage from the stuffing viewpoint.

Similarly, other components can also be positioned in the seat such that benefit can be gained from the created openings in the dead zones.

A problem with a construction of the aforementioned type, having ducts in the presence sensor in positions corresponding to the aforementioned dead zones, arises from the fact that these positions are only able to be determined once the complete seat construction is finished and has been analysed in the aforementioned manner, i.e. only once it has been established how a certain presence sensor operates in a certain seat construction. This means that the correct positions in which possible cabling or additional components are to be fitted cannot be known in advance. This makes the design, shaping and stuffing of the complete seat and its various integral components more difficult.

DISCLOSURE OF THE INVENTION:

An object of the invention is to provide an improved seat construction comprising a presence sensor of the type which includes dead zones of the aforementioned type, especially with a view to enabling, from the functional aspect, correct installation of an additional component adjacent to the presence sensor.

The invention is particularly suitable for use in those seat constructions which are ventilated, i.e. in which the additional component is constituted by a fan or a corresponding device for generating an air flow through the seat construction.

The aforementioned object is achieved by means of a device of the type stated in the introduction, which is characterized in that the seat construction comprises a layer of an air-distributing material disposed between the said presence sensor and the said air-current-feeding device, whereby a flow path is provided for the said air current through the air passage, the duct, the said layer of air-distributing material and the said air-current-feeding device.

DESCRIPTION OF THE FIGURES:

The invention will now be described with reference to a preferred embodiment and the appended figures, in which:

Figure 1 shows in simplified form a vehicle seat having a presence sensor which can be used in the control of an airbag,

Figure 2 shows a top view of a presence sensor, and

Figure 3 shows a cross-sectional view along the section A-A in Figure 2, illustrating the basic principles behind the present invention.

PREFERRED EMBODIMENT:

The invention will now be described firstly with reference to Figure 1, which is a simplified perspective view of a seat in the form of a vehicle seat 1 for, for example, private cars, lorries, buses and other vehicles. In a manner which is substantially previously known, the vehicle seat 1 is made up of a seat

cushion part 1a and a backrest part 1b, the seat cushion part 1a being provided with a presence sensor 2 for detecting at least whether there is a person or an object present in the vehicle seat 1. Expediently, the presence sensor 2 is also used to generate signals which indicate not only the possible presence, but also the weight and weight distribution of a passenger or an object in the seat 1.

The presence sensor 2 is per se of a previously known type and is formed by a bladder filled with suitable medium, preferably silicone. The presence sensor 2 is fitted inside the structure of the vehicle seat 1 in a manner which is not shown in detail, but which expediently makes use of a sheet-metal pan or spring mat forming a frame for the vehicle seat 1. The presence sensor 2 can further be provided with a disc (not shown) made of hard plastics material, which acts as a pressure-equalizing component fitted beneath the presence sensor 2. Beneath this plastics disc, a layer (not shown) of a suitable felt material may additionally be disposed, which in this case aims to protect the structure from wear.

Disposed adjacent to the presence sensor 2 there is a pressure transducer 3. This pressure transducer 3 is, in turn, connected to an electronic control unit 4. The control unit 4 can be constituted by a separate unit or can functionally be integrated in a control unit present in the vehicle. On the basis of recorded values relating to the pressure p in the presence sensor 2, which are measured with the aid of the pressure transducer 3, the control unit 4 can be set up suitably to control the activation of an airbag 5 disposed in the vehicle. For example, a gas generator 6 belonging to the airbag 5 can be controlled with suitably chosen power, alternatively with a suitably chosen time period for blowing in the gas from the gas generator 6, in dependence on measured pressure signals which, per se, constitute indications of weight, posture, etc. of a passenger in the vehicle seat 1.

In connection with the design and production of the vehicle seat 1, an extensive testing and analysis is normally made of the results of the signals generated by the presence sensor 2, i.e. of how different imaginary situations in which passengers and objects of different weight, weight distribution, etc. are placed in the vehicle seat 1 lead to different corresponding detected

pressure values where detection is effected with the aid of the pressure transducer 3. This testing is used to create a set of charted values, which are used in controlling the airbag 5. According to what was described in the introduction, such a testing can also be expected to result in certain regions of the presence sensor 2 not being able to make any contribution to the measurements with the pressure transducer 3, i.e. the signals from the pressure transducer 3 do not change, even if the load and the weight distribution acting against the presence sensor 2 are changed. Such regions are referred to as "dead zones" and thus make no relevant contribution to the information from the pressure transducer 3. That part of the presence sensor 2 which corresponds to a dead zone can in this case be removed. Such a dead zone 7 is shown diagrammatically in Figure 1 and is constituted by a duct through the presence sensor 2.

The invention is not limited to any specific configuration, number or specific dimensions of such dead zones, but can be applied in connection with different types of presence sensors which allow a certain part to be removed, for example in the manner shown in Figure 1.

The dead zone 7 illustrated in Figure 1 is also shown in Figure 2, which is a top view of the presence sensor 2. The duct corresponding to the dead zone 7 can be used, for example, to feed through an electric cabling. The present invention is specifically intended, however, for those situations in which the vehicle seat 1 is of the type which will be set up to ventilate the top surface of the seat, which is done for comfort and safety reasons in a vehicle. Both the driver's seat and other vehicle seats can in this case be set up to ventilate the surface of the seat through the blowing-in or extraction of air. In such seats there is a need to use a fan or corresponding device to feed an air current through the seat, more precisely past the surface of the seat so that it can be ventilated. More precisely, there is then a desire to ventilate a certain predetermined region 1c adjacent to the surface of the seat cushion part 1a, i.e. where a passenger normally sits.

Figure 3 is a cross-sectional view from the front of the seat cushion part 1a of the vehicle seat 1, along the sectional line A-A indicated in Figure 2. As can be seen from Figure 3, the seat cushion part 1a is made out of a foam

material 8. Modern-day seats are normally produced by so-called cold-foaming, which is a known production method for producing soft, elastic foam plastic. The foam material 8 for the precast parts which are used as the seat cushion part 1a and backrest part 1b respectively is also referred to as comfort foam and, as can be seen from Figure 3, is configured with a number of – expediently two or more – through-channels 9, which aim to allow the passage of an air current through the vehicle seat 1.

The invention aims, in particular, to allow an effective passage of an air current from the surface of the seat cushion part 1a, and onward out to the surroundings, with the aid of a fan 10 disposed on the bottom side of the seat cushion part 1a. According to the embodiment shown in Figure 3, the fan 10 is therefore of the suction-fan type. In order to allow passage of an air current, a first layer 11 of an air-distributing material is further disposed on top of the presence sensor 2. The air current which is conducted down through the openings 9 will reach the said first layer 11 of air-distributing material and is then spread in different directions so that the air current is distributed over substantially the whole of the surface in which the said air-distributing material is found. More particularly, it can be stated that the first layer 11 of air-distributing material allows passage of air in substantially the same direction as the plane along which the top side of the seat cushion part 1a is orientated, i.e. substantially in the transverse direction relative to the direction of the openings 9.

According to what has been explained above, there is additionally a dead zone 7 present in the presence sensor 2. In this dead zone 7 a corresponding opening is made, i.e. a duct which allows passage of air in either direction through the presence sensor 2. With reference to Figure 3, it can be noted that a basic principle behind the present invention is that a second layer 12 of air-distributing material is disposed beneath the presence sensor 2. More precisely, the said second layer 12 is arranged with dimensions which at least overlap the positions of the dead zone 7, on the one hand, and the position of the fan 10, on the other hand. This arrangement allows an air current to be fed from the surface of the seat cushion part 1a and through the whole of the seat cushion part 1a and then further out from the bottom side of the seat cushion part 1a (as indicated by

arrows in Figure 3). The air is thus conducted with the aid of the fan 10 from the top side of the seat cushion part 1a, through the channels 9 in the foam material 8 and onward to the topmost layer 11 of air-distributing material. Moreover, the fact that the second layer 12 of air-distributing material is disposed beneath the presence sensor 2 allows an air passage from the top side of the seat cushion part 1a, through the first layer 11 of air-distributing material, through the dead zone 7 and onward through the second layer 12 of air-distributing material, after which the air current reaches the fan 10 and can be fed out to the surroundings. The flow path of the air is indicated diagrammatically in Figure 3 with the aid of arrows.

The invention offers a substantial advantage in that the fan 10 can be placed in any chosen position in connection with the design of the vehicle seat 1. In other words, the particular seat 1 can be designed in such a way that the position of the fan 10 can be determined in advance, in principle fully irrespective of where the dead zones in the seat 1 end up being situated. A, from the functional aspect, correct installation of the fan 10 in relation to the presence sensor 2 is thus allowed, despite the fact that these components are not, per se, positioned directly adjacent to each other, but instead a flow path for the air current is allowed through the second layer 12 of air-distributing material.

The two layers 11, 12 of air-distributing material are expediently of similar type, having a porous fibrous structure made of relatively thin fibres which are relatively sparsely placed in an asymmetrical, three-dimensional network structure so that air supplied to the fibre network is duly distributed. This air-distributing material is not significantly compressed when someone sits down in the seat, so that its working is not then significantly affected in this situation. The air-distributing material further allows air flow both along and transversely to the principal extent of the seat cushion part, and also air flow in intermediate directions.

As the air-distributing material, so-called "spacer material", alternatively "3D-weave", is used. Other suitable materials are rubberized hair, reticulated foam, so-called cross-fibres or other suitable fibres. The invention is not

limited to any specific material, but can be realized with the materials which are suitable for providing the described air-distributing function.

The invention is not limited to the above-stated embodiment, but can be varied within the scope of the following claims. For example, the invention is not limited to use with a suction fan, but can alternatively be implemented with a blowing fan.

Furthermore, the invention is not limited to a seat cushion part of a vehicle seat, but can also, in principle, be implemented in a backrest part.

The principle behind the invention can also, in principle, be implemented in a simplified form without utilizing the topmost layer 11 of air-distributing material. In such an embodiment, the channels through the comfort foam are expediently positioned in such a way that air passage through a dead zone in the presence sensor is allowed in a correct manner.

The aforementioned plastics layer (not shown) which can be fitted beneath the presence sensor can either be placed directly beneath the presence sensor 2, i.e. between the presence sensor 2 and the underlying layer 12 of air-distributing material, or beneath the said layer 12 of air-distributing material. In the former case, there is expediently an opening in the plastics layer corresponding to the position of the dead zone 7, and, in the latter case, there is expediently an opening in the plastics layer corresponding to the position of the fan 10.

In general terms, it can also be stated that the invention is not limited to seat constructions only for vehicles, but can also be applied to other types of ventilated seats.